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# FISCAL OPERATIONS, MONEY SUPPLY AND INFLATION IN TANZANIA

A. A. L. KILINDO

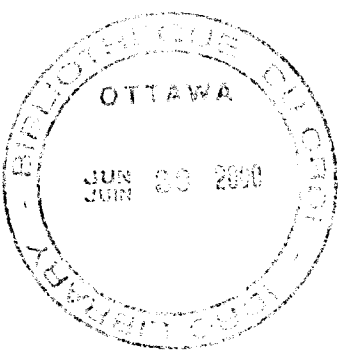


OMIC RESEARCH CONSORTIUM

OUR LA RECHERCHE ECONOMIQUE EN AFRIQUE

# Fiscal operations, money supply and inflation in Tanzania





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# Fiscal operations, money supply and inflation in Tanzania

by

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# I. Introduction

The Tanzanian economy has experienced many internal and external shocks since the late 1970s. All sectors of the economy have been affected by the shocks, whose manifestations have been, among other things, large budget deficits and an imbalance between productive and non-productive activities. The signs closely associated with these are large balance of payments deficits, high rates of inflation, declining domestic savings, growing government expenditure, falling agricultural production, decreased utilization of industrial capacity, poor transportation infrastructure and poor levels of social services.

High rates of inflation have many adverse economic and social consequences. The main economic consequences can be distinguished into three broad categories; balance of payments consequences; government finances consequences and monetary implications.

On the balance of payments, inflation effects relative prices and trade movements between export and food sectors, as well as between agriculture and non-agricultural sectors. The effect is the respective shift in resources between sectors, which in turn determines their respective performance and the emergence of parallel markets in the economy. Inflation also has foreign exchange implications both in real terms and in terms of the distribution of such resources between different categories of imports.

On government finances, inflation has negative effects on nominal expenditure movements. As the government attempts to sustain its real expenditure and levels of output performance in the inflation hit sectors, added to the cost of servicing government's use of credit facilities, inflation increases government spending commitments. Major revenue sources are also affected by inflation. This results in a narrowing of the tax base by drawing an important part of domestic income away from government taxability. The monetary implications of inflation relate to balance of payments disequilibrium, fiscal deficits, non-government public sector spending, and parallel market effects on the balance between currency in circulation and bank liquidity. The social effects of inflation are labour unrest, go slows, lockouts and even political unrest.

Inflation in Tanzania has exacerbated the economic crisis, outlined above. Government and policy makers have recognized the seriousness of the phenomenon in the economy. Though they have designed policies to curb it, amazingly, inflation is still uncontrollable. The purpose of this study is to increase the understanding of the Tanzanian inflation by investigating the link between fiscal operations, money supply and inflation.

Faced with social and economic development, the government has participated in the role of entrepreneur, engaging itself directly in production. This has increased expenditure

requirements. However, taxes, the main and most convenient source of revenue, have not grown fast enough to meet the required expenditure. As a result, large budget deficits have emerged. These have to be financed by bank borrowing, which in turn has accelerated the growth rate of the money stock and consequently accelerated inflation. It is hypothesized that this connection between fiscal operations and money supply growth has contributed to inflation. This study aims to present some policy options for government budgetary operations that do not effect monetary growth and could also curb inflation developments in the country. The next section of the study gives a brief background of fiscal operations, monetary movements and inflationary developments in Tanzania. Section III reviews literature while Section IV outlines the analytical framework. Section V displays estimation results and section VI presents simulation results. The study ends with a summary and conclusions.

# II. Fiscal, monetary and inflation developments

## Fiscal Developments

In Tanzania the government is the main economic agent responsible for promoting economic and social development. Since the early 1960s this has been implemented through development plans, with the first Five Year Plan in 1964. Following nationalization measures in 1967 through the Arusha Declaration, government expenditure commitments have been increasing. By the fiscal year 1970/71 government expenditure as a proportion of GDP reached 29% and by 1987/88 it reached 39%. In 1990/91 this proportion was 60%. During the 1970/71 to 1987/88 period the proportion reached peaks of 47% and 49% in fiscal years. 1974/75 and 1979/80 respectively[1]. Annual nominal expenditure growth averaged 25% between 1970/71 and 1989/90. In real terms, the growth was rather low (6% per annum). It was after the implementation of Structural Adjustment Programmes from 1986 onwards that the government somehow achieved control of its expenditure. This followed deliberate expenditure tightening measures.

Separating expenditure into current and development parts indicates the prominence of recurrent expenditure in the budget. The recurrent component has ranged between 60% and 80% of total expenditure for the period under review, 1970-91. Expansion of the public sector, an increase in public administration expenditure and in the provision of social services, such as Universal Primary Education, health and water were responsible for the recurrent expenditure growth.

Development expenditure steadily declined from 10% of total expenditure in fiscal year 1970/71 to about 5% (after registering a peak of 17% in 1978/79). This was due to two main factors. First, the implementation of Structural Adjustment Programmes involved shelving some development projects. Second, there was an acute shortage of the foreign exchange necessary for continuing development projects into the 1980s, which led to some being shelved.

There are three major sources of finance available to the government. These are taxation, non-bank borrowing and bank borrowing and external loans and grants. Taxes have, on average, accounted for over 80% of recurrent revenue. The major tax revenue sources have been import duties, sales taxes, income taxes, while parastatal dividends are the main non-tax revenue source. Recurrent revenue had a faster annual growth rate in the period before 1977/78 fiscal year (26% on average). After 1977/78 the growth declined to 23% per annum. Several factors have been held responsible for the slower growth after fiscal year 1977/78. Among these are a decrease in imports caused by

falling import capacity, thereby reducing import duty and sales tax on imports; decline in incomes leading to lower income tax revenues; poor export performance causing less export taxes (before they were waived in 1985); and poor performance of public enterprises resulting into low profits and hence less company taxes and parastatal dividends. In addition to the above factors, existence of a narrow tax base and an inefficient tax administration have contributed to the slow growth of recurrent revenue[2].

The trends outlined above indicate a situation where the state tries to achieve economic development through increased expenditure while the fiscal yield from enterprises necessary to finance the expenditure is not forthcoming. The result is a chronic budget deficit, with a corresponding need to finance it.

# Monetary Developments

## *Monetary trends*

A strong monetary and credit expansion in the economy started in 1967. Money supply, broadly defined to include currency in circulation, demand deposits, savings deposits and time deposits grew at an average of 18.8% between 1965 and 1970. Between 1970 and 1975 the rate reached 20% and by the period 1976-80 a 26.3% growth rate was reached. The record highest rate was realized in 1978/79 (47%). On average the 1971-80 period saw a 25% percent growth rate and 1981-89 period saw a 30% growth rate.

Domestic credit has had a significant role in the money supply developments. Credit expansion has marked an increase in its annual change from 19% on average in the late 1970s to over 35% after 1980. Heavy borrowing by Co-operative Unions and Marketing Boards pulled growth of domestic credit up to over 40% after 1984. Controlling monetary and credit expansion has been one of the targets of the government which has however, not been attained. During the implementation of Economic Recovery Programmes I and II from 1986 onwards annual money supply growth was targeted at 10%, but actual growth was 20%. In addition to borrowing by Marketing Boards and Co-operative Unions, substantial borrowing by the government from the banking system has been major cause of monetary expansion.

Domestic bank credit to the government has had prominence among the three components of money supply, followed by lending to the rest of the economy. Net foreign assets contribution has declined from 53% in 1966 to a negative contribution in 1988. The years after 1988 have, however, been marked by a positive contribution by this component.

Domestic lending has, in most years, contributed more than 50% in monetary expansion. Lending to the government is reflected by net claims on government by the banking system. This form of credit has had a high proportion in domestic credit, reaching a high of 83% in 1985. After 1985 there was more reliance on foreign sources (loans, grants and import support) for financing the recurrent budget.

## *Sources of monetary growth: balance sheet approach*

By looking at the balance sheet of the banking system we can ascertain the relative contributions of the fiscal deficit financing and other sources, particularly external resource inflows, into monetary developments. The balance sheet of the integrated banking system would be (Anand and van Wijnbergen, 1989):

| Assets | Liabilities |
|---|---|
| NFA | NW |
| CG | CU |
| CP | DD |
| 0 | TD |

Where, on the asset side NFA is net foreign assets, CG is net claims on government CP is bank lending to private domestic sector, and O is other assets. On the liability side NW is net worth, CU is currency in circulation, DD is demand deposits and TD time deposits.

Rewriting the balance sheet using standard definitions of the various concepts of money supply gives the following:

| Assets | Liabilities |
|---|---|
| NFA | $M_2$ |
| CG | NW |
| CP | |
| 0 | |

In this framework, fiscal operations of the government would affect money supply in that the (NCG) item on the assets side of the integrated banking system balance sheet is raised, and this is balanced in most times, by currency issue (CU) on the right hand side. This therefore increases money supply.

We can therefore go back to the balance sheet of the banking system and identify which items have contributed to the growth of money supply. This is shown in the tables summarizing the Assets and Liabilities of the Bank of Tanzania and Commercial Banks (NBC) as shown in Bank of Tanzania *Economic and Operations Reports.*

There is evidence of the dominance of domestic lending (loans and bills) in the assets of the commercial banks and claims on Government for the Bank of Tanzania.

Commercial bank lending captures the financing of the parastatal sector deficit. In sum, the combination of loans and bills and claims on government shows how the overall deficit financing contributes to development of high-powered money in the economy. Referring to the balance sheet framework outlined above, this would therefore add to monetary developments in the economy. As monetary growth has been pinpointed as one of the causes of inflation, there is therefore a close link between fiscal operations, money supply and inflation

This framework is also supported by Collier and Gunning (1991) who, after redefining the fiscal operations to include parastatal borrowing, found a close link between the budget, money supply and inflation.

## Inflation Developments

A periodization of inflation episodes by Ndyeshobola (1983) indicates that between 1964 and 1969 there was very low inflation (0.3% and 3.2%) on average for the national consumer price index (NCPI) and national food price index (NFPI) respectively. After 1972, the NCPI rose by an average of 16% until 1975, (with peaks of 19% and 25.9% in 1974 and 1975 respectively). The NCPI in 1974 and 1975 seems to have been increased by the severe food problems prevailing during the second half of the period. The NFPI reached as high as 35.0% and 30.6% in 1974 and 1975 respectively.

The period 1976-78 was a moderate inflation period. The indicators in most cases fell below the previous levels. The second round of fuel price increases towards the end of the 1970s pushed prices higher than the mid-1970s. Inflation pressures therefore picked up.

After 1981 the average rise in the NCPI was around 30% between 1981-84, and 32% between 1985-88, with a peak in 1985 (36%) after which a decline was marked. The downward trend after 1984 was caused by a decline in the NFPI.

In 1973 the National Price Commission was established with the main objective of determining reasonable price structures on a national basis and provide for their orderly variation when necessary. Many problems, however, were faced by the commission, among them the dependence of the economy on imported inputs which were outside the commission's control; severe shortages of the consumer goods; conflicting objectives leading to resource misallocation, and the fact that the number of controlled items was limited and they did not cover the whole range of consumer goods.

As the effects of inflation became more and more serious, the government designed policy packages like the National Economic Survival Programme (NESP I and NESP II); the Structural Adjustment Programme (SAP); and the Economic Recovery Programme (ERP I and ERP II) to address the problem. This followed recognition of the perverse impact of the phenomenon on output and productivity, purchasing power of wages, balance of payments, real interest rates and government fiscal operations. As pointed out earlier, all these adverse effects have contributed considerably to the worsening economic crisis in Tanzania.

# III. Literature review

Following Cagan (1956) and Friedman (1956, 1960, 1971) monetarist explanation of inflation has centred on money supply as the major cause. Later arguments said that in some cases it was more proper to view causation as running from inflation to money supply (Aghevli and Khan (1977a, 1977b, 1978); Sargent and Wallace (1973); Frenkel and Johnson (1977); and Jacobs (1977).

The latter studies emphasize the response of money supply to inflation through fiscal operations. This happens when governments resort to money creation to finance expenditure. If output cannot be increased to meet the increased demand for goods and services arising from the increased nominal stock of money a pressure on prices will be exerted.

Plausible reasons for expecting governments to resort to money creation are, among others, the presence of inefficient tax administration system; inadequate tax programs and a low tax base. Even when there is improvement in the tax administrative system poor macro economic management has also been pointed to culminate into poor tax performance, as Tanzi (1988) showed, and hence dependence on money creation to bridge the gap between revenues and expenditures.

The monetarist approach, that money supply growth causes inflation, can be tested by observing the correlation between the rate of inflation and the rate of monetary growth. Causality can be determined by statistical analysis and institutional evidence. The direction of causality can be detected by examining the timing of the relationship between changes in monetary growth and changes in inflation. By plotting the monetary growth rate and inflation against time on a graph one can observe whether the turning points in the monetary growth precede, follow or are contemporaneous with turning points in inflation.

Sims (1972) applied statistical techniques for 'causality testing' by first separating the variations in money and money income into the part that can be predicted from the past values of that variable, and the remainder which cannot. Using US data, Sims reached the conclusion that causality is unidirectional from money to income; rejecting the hypothesis that causality is from income to money.

Another causality study was undertaken by Sargent and Wallace (1973), investigating the direction of causality between money and prices during periods of hyperinflation, for certain European countries using an approach similar to Sims. They show that there is evidence to suggest that the causality was running from prices to money.

The institutional evidence on causality is done by observing the change in the growth rate of money supply at a particular point in time, and examining the historical

circumstances of the period decide whether that change in monetary growth is attributable to some change initiated by monetary authorities or whether the money stock responded passively to some other economic change. Friedman and Schwartz (1963) studied the monetary history of the United States and their evidence indicates that more often than not monetary changes are autonomous: in the sense of being initiated by policy changes by the monetary authorities or by other monetary developments. Another sighted example is the UK. Following changes in methods in regulating the banking system, and the floating of the exchange rate, the money stock started to grow very rapidly, followed by an accelerated inflation reaching a peak of over 25% in 1975.

Taking the world as a whole, the monetarist explanation of inflation is similar to domestic inflation. The world as a whole is regarded as a closed economy and therefore the world rate of inflation will be determined in the simplest case by the rate of the 'world money supply'. Following this, the world inflation rate of 1955-71 has been explained by the world rate of growth of money relative to growth of world output[3].

The evidence on developing countries supports the argument that governments should not depend on expansionary monetary developments to induce growth. They will be retarding growth while at the same time reducing the welfare of the public by the deterioration of real balances by the induced inflation. Evidence on the inflationary impact of deficits through their impact on money supply growth include those by, for example, Dutton (1971) in the case of Argentina and Aghevli and Khan (1977a and 1977b, 1978) in the case of Columbia, Indonesia, Dominican Republic, Brazil and Thailand.

Recent studies have included the external sector in the analysis of inflation in developing countries. A survey by Egwaikhide *et al* (1992) indicates that the results are, however mixed, with some studies revealing a significant role for exchange rate movements in determining inflation and others showing an insignificant role[4].

Studies on inflation in Tanzania are numerous, and point to a variety of factors as the cause[5]. Among those cited is a structural outside dependence of the Tanzanian economy which results into imported inflation. This arises from rising costs of imported inputs and finished goods, especially fuel prices. The oil shock of 1978 which increased oil prices by 80% between 1979 and 1980, had an adverse economic impact on Tanzania, resulting in a spending of 60% of export earnings just to import oil.

Another factor is the poor performance of foreign trade, leading to balance of payments problems, and an inability to import to supplement domestic consumption. Primary commodity markets were weakened by the world recession of the late 1970s and early 1980s leading to a deterioration of the terms of trade. On the export side there has been a continued decline in export volume of the major agricultural crops.

Productivity and efficiency decline in the economy is also responsible for the inflationary pressures. This has led to rising costs with effects transmitted to prices through cost-plus pricing methods. Poor performance of the agricultural sector has also exerted demand pressure on food and related items. A major factor cited as the cause of poor performance of this sector was the producer pricing policy, which set very low real producer prices. Such a pricing policy was, certainly, a disincentive to producers.

High population growth relative to the growth of GDP created pressure on available

resources. During the first half of the 1980s, for example, the average population growth rate of 3.3% was far above the GDP annual growth rates. Unfettered government spending, that has led to heavy government borrowing from the banking system and subsequently to excessive money supply in the economy, is another major factor.

Empirical studies on inflation have tried to touch on one or more of the above mentioned causes of inflation in Tanzania. Rwegasira (1974), in a study which linked deficits with rising prices, concluded that government expansionary finance which characterized the economy from 1963-72, had been one of the sources of rising prices. He pointed that other important sources, like inelasticities in agriculture and falling import capacity, joined deficit financing in causing upward pressure on the general price level. One point he stressed was that the price pressure originating from government expansionary financing was reinforced by the type of the excess spending which was characterized by a bias in favour of infrastructure, unplanned and unaccompanied by appropriate compensation policies.

Later in a quantitative study, Rwegasira (1976a) related money supply to the inflationary pressures that were building up towards the end of the First Five Year Plan. Empirical evidence showed that before 1969, changes in income velocity were quite strong in explaining changes in the price level and the balance of payments, but after 1969 there was noticeable co-movement of money supply and the price level, partly associated with enlarged and continued deficit financing. In his econometric study he reached the conclusion that money supply variables remained weakly related to inflation, leading him to a structural explanation of inflation[6]. However, Hyuha and Osoro (1982) used a more analytical interpretation of Rwegasira's results and used a larger sample, arriving at the conclusion that excessive money supply growth has contributed to the price changes in Tanzania.

A similar study stressing the structuralist approach was conducted by Curry (1978) who used the general problems of underdevelopment as a basic explanation for inflation. A combination of declining productivity, declining production and inefficiency accompanied by excessive money supply in the economy seems to be important in the process of inflation according to Malima (1980), implying that an increase in the rate of growth of output and a reduction in the rate of money supply growth could be a solution to inflation.

Loxley (1972) focused on the dependence on foreign sources of finance for the development plans as a source of unplanned government bank borrowing. This arises when the foreign funds are not delivered as expected and the government, having already committed itself to some projects, is forced to resort to borrowing from the banking system. This has an effect on money supply and the general price level.

A study by Ndulu (1975) cites population pressure and food supply deficiencies, industrial consumer goods demand pressure and supply inadequacies, and imports inability to make up for the insufficiency of the essentials and budget deficits predominant in the economy, as the main causes of inflation in Tanzania.

A predominantly structuralist point of view was taken by Ndyeshobola, (1980) who showed how the openness and structural dependence of the economy, population growth, declining productivity and inefficiency in agriculture and industry and poor performance

in the foreign sector are related to each other and to inflation in the economy.

Kuuya (1975) separated the causes into endogenous and exogenous. Exogenous inflation is caused by the import substitution type of industrialization, the colonial type of economy inherited and shortcomings of an underdeveloped economy. Domestic causes include a deliberate and genuine desire on the part of the government to pursue rapid, revolutionary development policies, which means that expenditures grow very fast. Envisaged sources of this development expenditure were surplus from the recurrent budget and foreign sources. Since revenue has not been growing at the same pace as expenditure (as evidenced above), and foreign sources have not been coming forward as expected, the government has had to resort to domestic borrowing mainly from the banking system. The above studies on inflation in Tanzania suggest it that both structuralist and monetary explanations of inflation are relevant in Tanzania.

A chain of events is responsible for the inflationary experience Tanzania is having. These include oil price increases, increased prices of imported goods, worldwide recession leading to a decline in the prices of exports, persistent deterioration in the terms of trade and stagnant or even a decline in agricultural production.

These combined to produce deficits in the balance of payments. A chain of adverse effects in the economy was started again. Imports had to be slashed drastically, thus affecting industrial production. Most of the manufacturing industries are therefore operating at less than 50% of their installed capacity or even at 25%. Agricultural production has suffered from inadequacy of inputs as well as unfavourable climatic conditions.

The decline in agricultural and industrial production adversely affected government revenues from sales tax and customs duties. The resulting budget deficits were of necessity to be financed by borrowing from the banking system (in particular the Central Bank), owing to the absence of a developed domestic capital market.

From the above premises, it is proper to expect budgetary operations to be closely linked to the monetary developments and hence inflation. In the subsequent section we display the framework of analysis that captures that link.

# IV. Methodology

Two monetarist tenets have been the basis of a past analysis of the relationship between government deficit and inflation. These are 1) the Cagan Model, which emphasizes a one-track relationship between inflation and government deficit in a way that the latter causes the former (Cagan, 1956), and 2) the Aghevli and Khan two-track model introducing a feedback between inflationary developments and government budget deficits (Aghevli and Khan, 1977, 1978). In the former tenet government deficits would result from exogenously determined expenditure increases (a policy variable) and revenue collection lags. In the second tenet, however, in addition to the above factors, government budget deficit would also be a result of domestic inflation. The argument here is essentially that inflation leads to a widening of fiscal deficits financed through the banking system (in particular the Central Bank) leading to further increases in the money supply and further increases in prices. The identification of this two-way relationship between inflation and government budget deficit in the Aghevli and Khan model is important in our case, as pointed out by Ndyeshobola (1983), for it takes into consideration the plausible reasons for expecting government expenditures in the country adjusted to nominal income increases arising from inflation. This would also mean that even if the government fully recognizes the need to restrain expenditures during periods of inflation, it still finds it difficult to reduce its past commitments in real terms. This tenet identifies an important element of the inflationary consequences on the economy. A framework that links money supply and inflation in two ways seems proper for our purpose.

## A Self Generating Inflation Model

The model that links reactions of the government deficits to inflation was developed by Aghevli and Khan (1977a, 1977b, 1978). The basic model involves five equations; the price equation, government expenditure and revenue equations, and the supply of money. A definitional equation explaining the formation of expectations is the fifth.

## Price equation

The framework starts by specifying the demand for money function, an inverse of which is the price equation. Demand for money function is central to the monetarists theory of inflation. The model starts by a specification of demand for real balances as:

$$\log (M/P)^d = a_0 + a_1 \log y_t - a_2 \; PE \qquad (1)$$
$$a_1 \; a_2 > 0$$

where $M$ = stock of nominal money balances
$P$ = Price level
$Y$ = Level of real income
$PE$ = expected rate of inflation.

Assuming that prices adjust to the excess demand for money, adjustment of actual stock of real balances to the desired level is specified as:

$$D\log (M/P) = K [\log (M/P)^d - \log (M/P_{t-1}] \qquad (2)$$
where $0 < \kappa < 1$ is the adjustment coefficient.

Expected rate of inflation is generated following adaptive expectations method formulated by Cagan (1956), as follows:

$$PE = \beta D\log P_t + (1 - \beta) PE_{t-1} \qquad (3)$$

where $\beta$ denotes the coefficient of expectations and $DPt$ denotes the current rate of inflation.

The level of real money balances can be solved by the substitution of (1) into (2) to get:

$$\log (M/P)_t = \kappa a_0 + \kappa a_1 \log Y_t - \kappa a_2 PE + (1-\kappa) \log (M/P)_{t-1} \qquad (4)$$

The equation for the price level is then obtained by inverting Equation (4) to arrive at

$$\log P_t = -\kappa a_0 - \kappa a_1 y_t + \kappa a_2 PE - (1-\kappa) \log (M/P)_{t-1} + \log m_t \qquad (5)$$

# Government Expenditure

Desired real government expenditure, is a function of income.

$$\log (G/P)^d_t = g_0 + g_1 \log Y_t \qquad (6)$$
$$g_1 > 0,$$

and it is defined as the real income elasticity of expenditure. The adjustment of expenditure to the difference between 'desired level and actual real expenditure in the previous period is specified as:

$$D \log (G/P)_t = v [\log (G/P)^d_t - (G/P)_{t-1}] \qquad (7)$$

here v is the coefficient of adjustment

It is assumed that the government attempts to keep its expenditure constant in the face of an increase in the price level. The real expenditure equation is obtained by substituting Equation (6) into Equation (7) to get:

$$\log (G/P)^t = vgo + vg1 \log Yt + (1\text{-}v) \log (G/P)\, t\text{-}1 \quad (8)$$

Our main interest here is the mean average lag in the adjustment of real government expenditures which is defined as $(1\text{-}v)/v$.
In nominal terms equation (7) would be:

$$\log G_t = vg_0 + vg1 \log Y_t + (1\text{-}v) \log (G/P)_{t-1} + \log P_t \quad (9)$$

# Government Revenue

Desired government revenue ($R^d$) is specified as a function of nominal income ($Y$).

$$\log R^d_t = t_0 + t_1 \ (\log Y_t + \log P) \quad (10)$$

The elasticity of revenue, $t_1$ will be positive. The difference between desired revenue and the actual revenue raised in the previous period is the determinant of the adjustment of revenue.

$$D\log Rt = r \ [\log R^d_t - \log R_{t-1}] \quad (11)$$

where r is the coefficient of adjustment,
$1 > r > 0$.

Our main interest is an equation for nominal revenues which we can obtain by substituting Equation (10) into (11) to get:

$$\log R^t = rt_0 + rt_1 (\log Y_t + \log P_t) + (1\text{-}r) \log R_{t-1} \quad (12)$$

Coefficients of interest here are $r, v, t_1$ and $g_1$. In this framework, even if at the beginning the budget is balanced, as nominal income rises, an increasing divergence between expenditure and revenue will be the outcome if the former adjusts faster than the latter, Aghevli and Khan (1977a, 1977b, 1978).

According to this framework, the nominal deficit will be a function of the increase in the price level provided '$r$' is less than '$v$' even though $t_1 = g_1$.

There are plausible reasons for expecting government expenditures in a developing country like Tanzania to adjust faster than revenues to nominal income increases arising from inflation. First, the tax system has a low elasticity and collection lags are long.

Second the country has an inefficient tax administrative system. Finally the government finds it difficult to reduce its commitments in real terms and therefore runs deficits.

## Money Supply

From the integrated banking system balance sheet, the asset side is taken to present money supply identity.

$$M_t = NFA + CG + CP + 0 \quad (13)$$

where

| | | |
|---|---|---|
| *NFA* | = | net foreign assets |
| *CG* | = | claims on government |
| *CP* | = | credit to the private sector |
| and | | |
| 0 | = | other assets. |

In terms of changes, equation 13 becomes

$$DM = DNFA + DCG + DCP + D0 \quad (13a)$$

In Tanzania, government borrows from the Central Bank to finance the budget deficit. We can therefore equate the difference between revenue and expenditure to the change in claims on government.

$$DCG = G\text{-}R \text{ External Inflows} \quad (14)$$

Substituting Equation 14 into 13 gives us

$$DM = DNFA + (G\text{-}R) + DCP + D0 \quad (15)$$

This can be presented as:

$$M_t = M_{t-1} + DNFA + (G\text{-}R) + DCP \quad (16)$$

The complete model then will comprise Equations (3), (9), (12) and (16). In a concise form, the model can be stated as follows:

(1) $\log P_t = ka_0 - ka_1 \log Y_t + ka_2 PE_t - (1\text{-}k) \log (M/P)_{t-1} + \log M_t$

(2) $\log G_t = vg_0 + vg_1 \log Y_t + (1\text{-}v) \log (G/P)_{t-1} + \log P_t$

(3) $\log R_t = rt_0 + rt_1 (\log Y_t + \log P_t) + (1\text{-}r) \log R_{t-1}$

(4) $Mt = M_{t-1} + DNFA + (CG\text{-}R) + DCP + DO$

(5) $PE = BDlogP_t + (1\text{-}B)PE_{t\text{-}1}$

From the results of the above system of equations we shall be able to compute the average time lags as follows:

Average time lags for
Money demand = $(1\text{-}k)/k$
Government expenditure = $(1\text{-}v)/v$
Government revenue = $(1\text{-}r)/r$

The lags in government expenditures and revenues are the main links which relate increase in the money supply and inflation in two ways through reactions of the fiscal deficit to inflation.

The above model is estimated for the period 1970-91. However, following the reforms that have been instituted in the economy after 1984, we hypothesize the presence of a structural break in the relationship. To arrive at this we ran the model for the period 1970-84 and 1985-91 so that the Chow test for structural break is performed. The results indicated the presence of a break.

The results show that the fiscal operations, money supply and inflation relationship has taken a new look and hence require an alternative specification. Several plausible reasons may explain this break. First, there has been some little success in keeping the budget in reasonable shape, especially during Economic Recovery Programmes (ERP I and II). This has reduced money creation for budget financing as a source of monetary growth.

In Tanzania there are binding ceilings on bank interest rates. As Shaw (1973) indicated, these ceilings can be evaded through direct contracts between investors and savers outside the banking system. This tendency grew as the real interest rate turned negative in the high inflation periods after reforms. The demand for money function can therefore be modified to include real interest rate on deposits and real government bond rate. McKinnon (1973) emphasized that many investment projects in developing countries are self-financed, especially medium size and small enterprises. Because such projects commonly require relatively large lump-sum expenditure, investors must save for a period of time before undertaking one. Due to the low interest rates of the financial system, the savings are not done through deposits. This would raise demand for real balances. Since the Tanzanian economy is no exception to the above characteristics of less developed countries, it was thought that the demand for money function should incorporate the McKinnon-Shaw hypothesis by adding the savings rate as an explanatory variable.

Recent studies of the demand for money in LDCs have also included the external sector in the function. As Eqwaikhide *et al* (1992) indicate, the inclusion of the exchange rate in the function would take care of the external sector. Thus the inclusion of exchange rate in demand for money function for the period after reforms, when the role of the external sector was even more pronounced, was thought to be proper.

The government sector specifications for the latter period are revised to include the role of expectations and foreign inflows. Following Heller (1980), it is presumed that

budget decision-makers take account of their price expectations in formulating the budgetary and revenue plans for a future period. This is included in the revenue and expenditure equations by the expected prices and the ratio of actual price to expected prices.

Foreign inflows played a significant role after the 1984 period. This has, in a way, affected the government's fiscal position. Further, as some of the inflows have been conditional, the government's discretion in determining the magnitude of budgetary response to cost increases caused by inflationary pressures may have been affected. This leads us to include the foreign inflow variable in the government sector equations.

In the post reform period, demand for real balances is specified as:

$$(M/P)_t = Ka_0 + Ka_1 PE + Ka_2 yt + Ka_3 S/Y, + Ka_4 Exr + (I - K) \log (M/P)_{t-1} \qquad (17)$$

where S is Savings, and EXR is the exchange rate, K is the adjustment coefficient of the desired stock of money balances to the actual (see Equation (1)).

The government expenditure Equation (9) is revised by the inclusion of external inflows EIF and actual and expected inflation.

$$\log (G/P)_t = Vgo + Vglog1Y_t + Vg2\ EIF + Vg3\ PE + Vg4\ Pa/Pe + (1\text{-}V) \log G/P_{t-1} \qquad (18)$$

where V is the adjustment coefficient of expenditure to the difference between desired expenditure and actual expenditure in the past (from Equation (7)).

Government revenues are specified as a function of the level of nominal income and past revenue and the ratio of actual to expected inflation.

$$\log R_t = rto + rt_1 (log\ Yt + \log Pt) + (1\text{-}r) \log Rt\text{-}1 + rt_2 (Pa\backslash Pe) \qquad (19)$$

# V. Empirical results

In the preceding section we identified the Aghevli and Khan Self Generating Inflation Model as a proper relationship explaining fiscal operations, money supply and inflation in Tanzania. Two aspects of the model were used; one which we thought would fit data for the period 1970-84 (before reforms) and one that incorporates the reforms after 1984. The decision to revise the model was not arbitrarily arrived at. A test for structural break (Chow Test) was carried by estimating the model for the whole period 1970-91 and for sub-periods 1970-84 and 1985-91. The existence of a structural break was confirmed, leading us to the revised model.

In Tables 1 and 2 we present the results of the period 1970-84 and 1985-91. The second period used quarterly data.

**Table 1: Regression Results, Annual, 1970-84**

1. $\log P_t = 13.586 - 0.630 \log Y_t + 0.013 PE_t - 2.54 (M/P)_{t-1}$
   (2.87) (5.42) (-2.14)
   $+ \log M_t$
   $R^2 = 0.66$
   DW = 1.41

2. $\log G_t = 5.968 + 1.055 \log Y_t + 0.54 \log (G/P)_{t-1}$
   (39.33) (9.34)
   $+ \log P_t$
   $R^2 = 0.95$
   DW = 1.96

3. $\log R_t = 0.940 + 0.510 \log Y_t + 0.590 \log R_{t-1}$
   (1.940) (2.02)
   $R^2 = 0.98$
   DW = 1.82

4. $\log M_t = 2.155 + 0.862 \log G_t - 0.35 \log R_{t-1}$
   (6.44) (2.362)
   $R^2 = 0.96$
   DW = 3.87

5. $PE = 0.98D \log P_t + 0.02 PE_{t-1}$ $R^2 = 0.95$
   (23.2) (0.88) DW = 2.91

**Table 2: Regression Results, Quarterly, 1985-91**

1. $\log P_t = 12.45 - 1.10 \log Y_t + 0.0006 PE_t$
(55.64) (3.78)

$- 0.06 (M/P)_{t-1} + 0.05 (S/Y)_t + 0.008 EXR_{t + Log} M_t$
(3.64) (2.29) (5.21)

$R^2 = 0.99$
DW = 2.8

2. $\log G_t = -69.86 + 0.766 \log Y_t + 0.90 (G/P)_{t-1}$
(8.52) (3.64)

$+ 0.47 (Pa/PE)_t - 4.64 EIF_t$

(1.96) (-2.41)

$R^2 = 0.99$
DW = 0.82

3. $\log R_t = -4.15 + 0.51 \log Y_t - 0.32 (Pa/Pe)_t$
(7.27) (-4.52)

$+ 0.60 \log R_{t-1}$
(11.04)

$R^2 = 0.99$
DW = 1.46

4. $M_t = M_{t-1} + DNFA + (G-R) + DCP + D0$

5. $PE = 0.856 D\log P_t + 0.144 PE_{t-1}$
(7.66) (1.25)

$R^2 = 0.97$
DW = 2.44

As is indicative from Table 1, all equations (estimated by ordinary least sqares (OLS) have a good fit with the price equation having the lowest R-squared (0.66). Coefficients of the three estimated equations have all the right signs and are significant at conventional levels.

The results for the revised model for the period 1985-91 show significant results and right signs for the parameter estimates in most cases.

In the price equation it is indicated that growth in real income would reduce the price level as would real balances lagged one period while expectations, savings rate and exchange rate have positive effects on price level. The overall goodness of fit of the equation is higher than that of the 1970-84 period with R squared of 0.99.

In the expenditure equation all variables are significant at 1% level, except price expectations whose significance level is 5%. There is an unexpected sign of the coefficient

on foreign inflows. A possible explanation is the conditionality nature of inflows.

The revenue equation also has significant and correct signs of the parameter estimates. The effect of income and lagged revenue on current revenue is positive and significant at 1% confidence level. From Table 3 we see that for the period 1970-84, the partial adjustment coefficient for government expenditure (0.46) is slightly larger than that for tax revenue (0.41). This is also true for the case for the coefficients $g_1$ (2.20) which is greater than $t_1$ (1.20). As shown earlier, as long as v>r, the nominal deficit will be a function of the increase in the price level even if 'g' was equal to 't'. From the partial adjustment coefficients for expenditure and revenue the average time lag for expenditure is shorter than that of revenue. This means that in a period of rising prices the revenue from taxes will continually fall short of government expenditures and result in increasingly deficits. This complies with the results obtained by Aghevli and Khan (1977a, 1977b, 1978).

**Table 3: Relative Adjustment Speeds and Long run elasticities**

| | Period | |
|---|---|---|
| | 1970-84 | 1985-91 |
| k | 0.99 | 0.90 |
| v | 0.46 | 0.10 |
| r | 0.41 | 0.40 |
| $g_2$ | 2.20 | 0.85 |
| $t_1$ | 1.20 | 1.20 |
| 1-v/v | 14.40 | 9.00 |
| 1-r-r | 16.80 | 1.50 |

Source: Computed from Tables 1 and 2.

The results for the period after 1984 differ from those obtained for the former period. The partial adjustment coefficient for government expenditure is 'v' smaller than that of tax revenue 'r'. Further, the marginal income propensities of desired government expenditure is smaller than the desired marginal income propensity of tax revenue, i.e., v<r and g<t. Similarly the average time lag for expenditure is longer compared to that of tax revenue.

The relative adjustment speeds for the period after 1984 differ from the Aghevli-Khan results. Several explanations can be given for this.

First, Tanzania after 1984 was moving to a higher inflation rate period (when market prices rather than controlled prices are used as a measure of inflation). As Heller (1980) shows, such movement to higher inflation rates will ultimately have a lower expenditure adjustment coefficient than it did in the lower inflation rate period. Conversely, revenues tend somewhat to adjust more quickly in a period of higher inflation.

Second, it would seem that the government had a considerable amount of discretion in determining the magnitude of the budgetary response to cost increases caused by inflationary pressures. Apart from this, the government has also been influencing certain price increases.

Third, the specific economic, legal and political environment obtaining after the reforms have greatly influenced the nature of their response to cost increases. For example, increased dependence on foreign aid and the conditionality attached to it has surely influenced the amount of discretion in deciding by how much and how fast to adjust the fiscal variables.

Fourth, even in other country studies the Aghevli-Khan model has not been universally valid. For example a study by Heller (1980), revealed that 12 or 13 out of the 24 studied countries complied with Aghevli-Khan's results, while 9 or 10 of the countries did not. This points to the need for a more detailed analysis of the country's fiscal structure and characteristics of the inflationary situation for the two periods before one can get conclusive results. This was beyond the scope of this study.

Finally, there has been concerted effort to increase tax revenues through restructuring the tax administrative system and increased revenue efforts. This has probably reduced the collection lags and increased the speed of adjustment.

# VI. Model simulation

Having obtained regression results, we went further and simulated the model. The purpose of the simulation was model testing and evaluation. For that purpose what we required was *expost* or *historical simulation*. The simulation began in the second quarter of 1985 to the fourth quarter of 1991. By doing so, a comparison of the original data series with the simulated series for each endogenous variable provide a useful test of the validity of the model. The results of simulation are presented in Figures 2 to 4.

It is evident from the figures that the simulated path of the price index, government expenditure and government revenue tend to trace the general movement of the actual series over the same sample period fairly well. There are, however, large errors in the period after 1988 in the price index as the actual price index seems to be smoother than the simulated price index.

A further verification that the model does well in tracking the historical behaviour of endogenous variables is given by the correlation between actual and simulated series, as given in Appendix Table 7.

Policy simulation through adjustment to shocks was also performed. The shocks included increase in external inflows, increased real GDP and decreased credit to the private sector. Figures 5 to 7 indicate what would happen to prices, government expenditure and money supply after the shocks as specified.

**Figure 1: Inflation, growth in GDP and money supply, quarterly, 1985-1991**

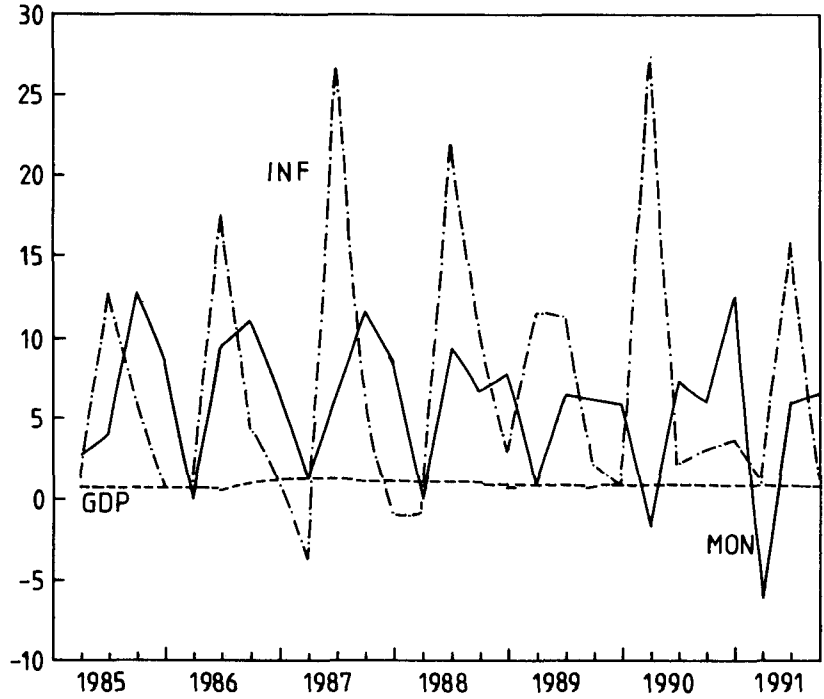



**Figure 2: Price index: Simulation results, quarterly, 1985-91**

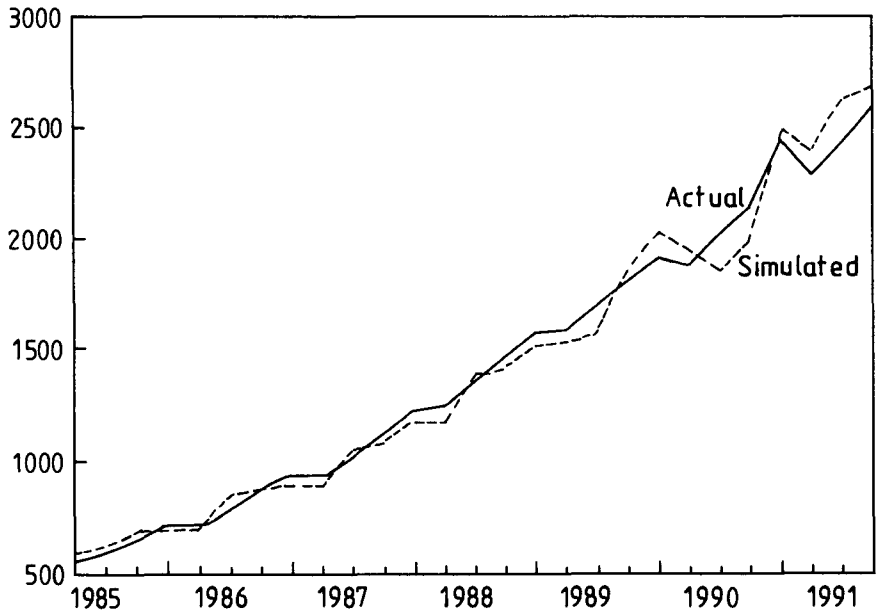


**Figure 3: Expenditure simulation results, quarterly, 1985-1991**

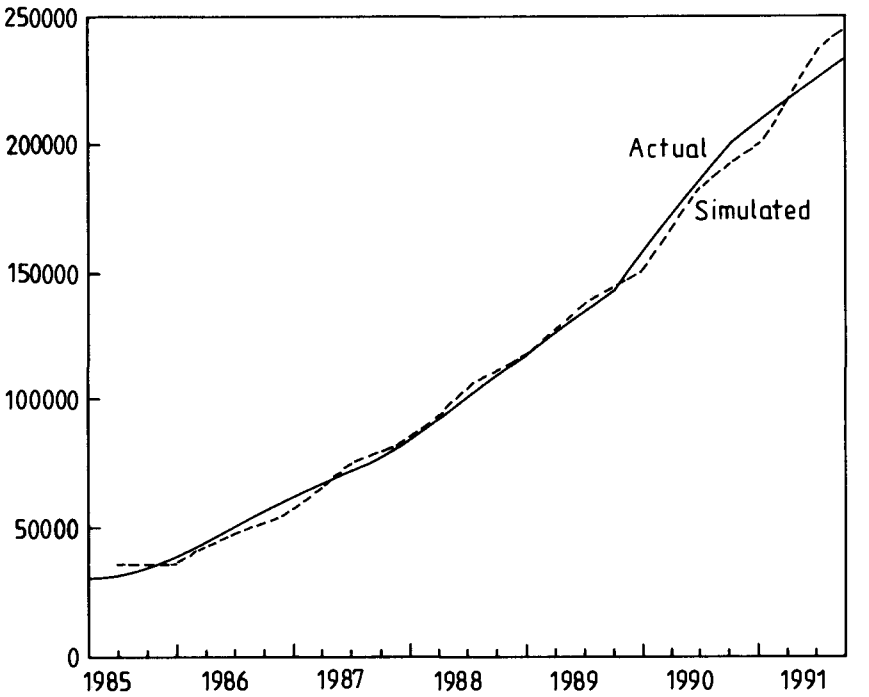



**Figure 4: Revenue simulation results, quarterly, 1985-1991**

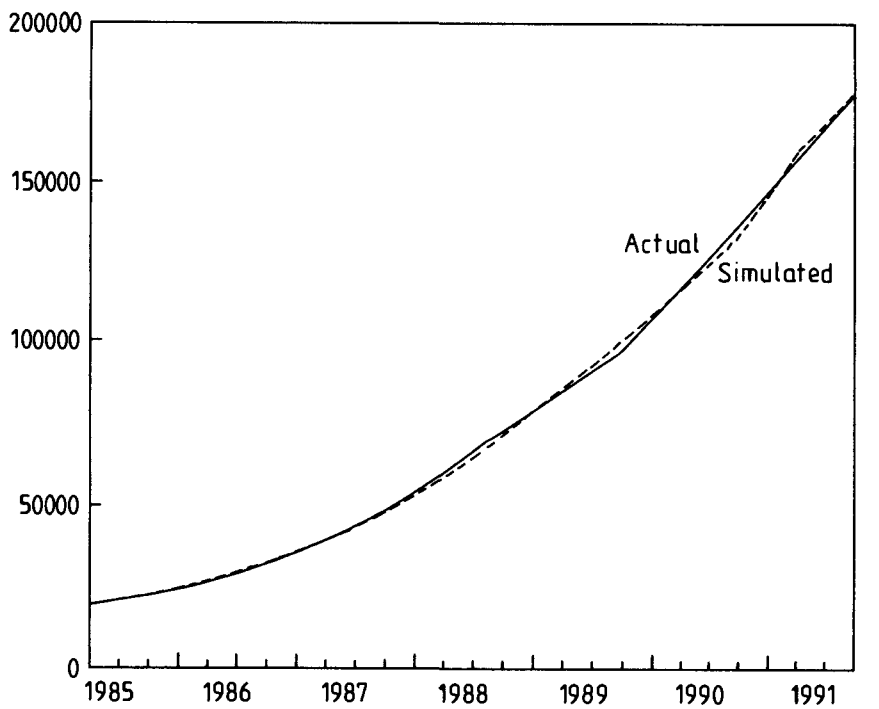


**Figure 5: NCPI policy simulation results, quarterly, 1985-1991, (GDP)**

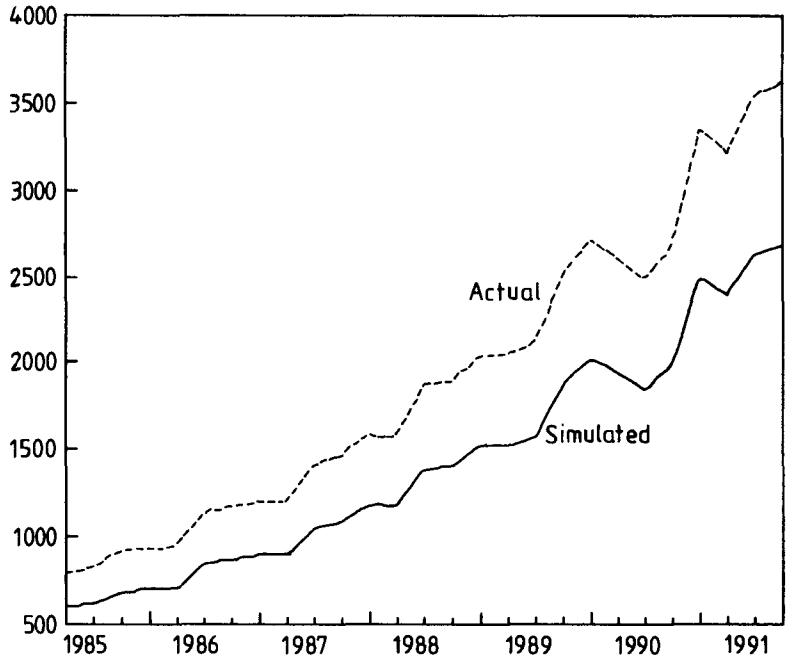



**Figure 6: Expenditure Policy simulation, quarterly, 1985-1991, (inflows up)**

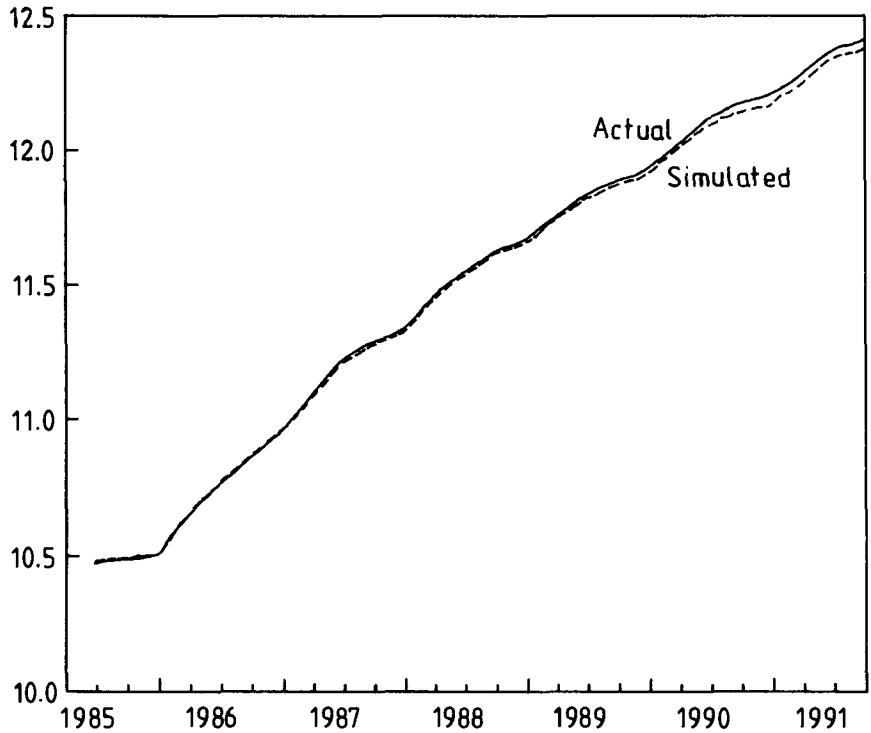
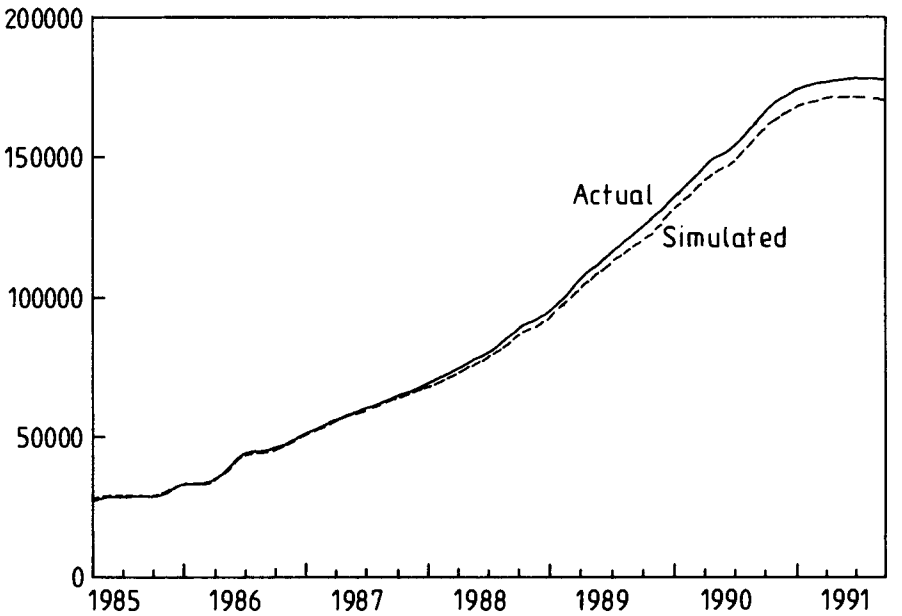


**Figure 7: Money supply simulation, quarterly, 1985-1991 (less credit)**



# VII. Conclusion

The aim of this study was to establish the relationship between fiscal operations, money supply and inflation in Tanzania. A structural model borrowed from Aghevli and Khan (1977a, 1977b, 1978) was used to estimate the relationships. For the period 1970-84 the model fitted the data well but thereafter some of the equations indicate the existence of a structural break. A reformulation of the model to include some aspects of the reforms indicate a good fit among the variables for the demand for money function and government expenditure functions.

The study has established a strong relationship between fiscal operations, money supply and inflation in Tanzania. This is evidenced by the significant coefficients of the structural model and simulation results that show that the historical series are adequately tracked by the simulated series. While during the 1970-84 period differencial elasticities in expenditure and revenue were the main element sustaining the self generating inflation, during the period 1985-91, it is the role of the Central Bank in the money supply process, through its provision of credit in response to external inflows, that would sustain inflation. This, however, does not eliminate the role of the budget in the inflation process, since most credit in the economy has impact on the budget since the government finances loss-making parastatals through bank borrowing.

The findings of this study led us to several policy implications. There is need for the adoption of a restrictive monetary policy in which the supply of money must be constrained to grow steadily at the rate of growth of real output.[7]

Since the growth of money supply is greatly influenced by expansion of credit, (especially to government), there is also need to limit government bank borrowing to finance deficits[8]. In line with this policy, it is necessary to streamline the banking system so that competitiveness is achieved. Dependence on bank borrowing by the government could be reduced if the domestic capital market is developed by, for example, making the return on securities more attractive to the public. This would enhance the working of open market operations as a tool of monetary policy in the country.

Further, government intervention in general economic activities should be limited to reduce government spending commitments. This will relieve the government of difficulties of restraining expenditures during periods of inflation.

On the revenue side, there is a need to reshape the revenue system. This would involve widening the tax base, simplifying the tax collection system, and giving spending units greater room for raising their own revenue.[9]

As findings in other developing countries show, there is a need to identify taxes which have longest collection lags so that indexation of their nominal value is done.[10]

The elimination of collection lags is important, as in such a case the government will not have to resort to the printing press for lack of normal revenue sources to meet the demand for immediate government expenditure.

# Appendix Table 1: Government finances (Tshs million)

| Year | Recurrent Revenue | Recurrent Expenditure | Overall Deficit/ Surplus | Development Expenditure | Total |
|---|---|---|---|---|---|
| 1974/75 | 3945.9 | 3961.1 | -15.2 | 2225.0 | 6186.1 |
| 1975/76 | 3918.5 | 3715.6 | 202.9 | 2253.0 | 5968.6 |
| 1976/77 | 6129.0 | 4702.5 | 1426.5 | 3244.3 | 7946.8 |
| 1977/78 | 6082.1 | 5563.3 | 518.8 | 3303.6 | 8866.9 |
| 1978/79 | 6812.0 | 8295.6 | -1483.0 | 4749.9 | 13044.9 |
| 1979/80 | 7757.3 | 9229.0 | -1471.7 | 5184.0 | 14413.0 |
| 1980/81 | 8872.0 | 10136.0 | -1264.0 | 4759.0 | 14895.0 |
| 1981/82 | 10960.0 | 13214.1 | -2254.1 | 5185.4 | 18399.5 |
| 1982/83 | 13645.0 | 14871.5 | -1726.5 | 4404.0 | 19275.5 |
| 1983/84 | 15466.7 | 18182.0 | -2715.3 | 5736.0 | 23918.0 |
| 1984/85 | 19143.0 | 21336.5 | -2193.5 | 5391.1 | 26727.6 |
| 1985/86 | 22321.0 | 27402.3 | -5081.3 | 5817.4 | 33219.7 |
| 1986/87 | 34499.1 | 40390.1 | -5891.0 | 15091.1 | 55481.2 |
| 1987/88 | 55450.0 | 60071.0 | -4621.9 | 17255.0 | 77326.0 |
| 1988/89 | 71788.7 | 92262.1 | -20773.4 | 15746.9 | 108009.0 |
| 1989/90 | 94655.0 | 115983.0 | -21328.0 | 16263.0 | 132246.0 |
| 1990/91 | 124044.0 | 159476.0 | -35432.0 | 34959.0 | 194415.0 |

Source: Mbogoro (1991).

# Appendix Table 2: Composition of bank of Tanzania assets (%)

| | FA1 | $FA_2$ | SDR | CG | LB | RA | P & E | OA | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 1969 | 80.0 | - | - | 21.9 | 5.0 | 5.0 | 2.3 | 0.4 | 100 |
| 1970 | 32.2 | 1.2 | 24.3 | 7.3 | 5.8 | - | 1.2 | 1.6 | 100 |
| 1971 | 21.4 | 3.2 | 21.3 | 33.7 | 10. | - | 0.9 | 0.7 | 100 |
| 1972 | 39.8 | 2.8 | 17.8 | 41.7 | 7.5 | - | 0.8 | 0.2 | 100 |
| 1973 | 48.4 | 3.0 | 19.4 | 30.4 | - | - | 0.9 | 0.2 | 100 |
| 1974 | 13.7 | 0.5 | 13.2 | 27.3 | 32.8 | - | 0.7 | 0.1 | 100 |
| 1975 | 16.0 | 0.3 | 10.9 | 38.4 | 30.3- | 0.8 | 0.1 | 100 | |
| 1976 | 23.5 | 1.3 | 10.7 | 41.2 | 19.4 | 0.9 | 1.0 | 0.2 | 100 |
| 1977 | 49.8 | 1.2 | 9.0 | 42.5 | 8.4 | 1.0 | 1.7 | 0.1 | 100 |
| 1978 | 13.4 | 1.1 | 10.1 | 29.1 | 11.1 | 1.7 | 1.0 | 0.8 | 100 |
| 1979 | 9.4 | 0.4 | 8.2 | 55.1 | 3.3 | 2.4 | 0.8 | 1.6 | 100 |
| 1980 | 4.2 | 0.8 | 8.7 | 72.1 | 3.2 | 2.0 | 0.8 | 1.3 | 100 |
| 1981 | 3.2 | 0.0 | 8.3 | 21.9 | 4.4 | - | 0.8 | 1.9 | 100 |
| 1982 | 2.1 | 0.0 | 7.3 | 76.3 | 4.3 | 0.0 | 0.9 | 2.3 | 100 |
| 1983 | 3.1 | 0.4 | 10.9 | 81.2 | 2.7 | 1.5 | 0.9 | 2.8 | 100 |
| 1984 | 3.0 | 0.1 | 12.1 | 79.6 | 3.0 | 1.1 | - | 5.3 | 100 |
| 1985 | 0.8 | - | 5.7 | 81.1 | 0.0 | - | 0.6 | 3.7 | 100 |
| 1986 | 4.8 | 1.3 | 13.5 | 81.7 | 3.7 | 2.9 | 1.4 | 2.5 | 100 |
| 1987 | 2.7 | 0.1 | 11.5 | 66.3 | 20.5 | 5.8 | 1.9 | 6.5 | 100 |
| 1988 | 6.2 | 0.0 | 11.4 | 35.0 | 28.2 | 9.3 | 2.7 | 4.4 | 100 |
| 1989 | 5.1 | 0.1 | 13.9 | 21.0 | 24.4 | 25.3 | 2.8 | 4.6 | 100 |
| 1990 | 10.3 | 0.0 | 7.9 | 21.9 | 6.5 | 24.4 | 2.6 | 29.6 | 100 |
| 1991 | 11.3 | 0.0 | 8.5 | 8.5 | 1.5 | 31.0 | 2.8 | 37.2 | 100 |

Source: Computed from Bank of Tanzania Economic and Operation Reports, various years.

Key:

| | | |
|---|---|---|
| $FA_1$ | = | Foreign Exchange |
| $FA^2$ | = | SDRs |
| CG | = | Claims on Government |
| Lb | = | Lending to Banks |
| Ra | = | Revaluation Account |
| PE | = | Premises and Equipment |
| OA | = | Other Assets |

# Appendix Table 3: Composition of bank of Tanzania liabilities (%)

| | CC | CGD | BB | OD | FLB | IMF | SDR | RA | OL | CL | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1969 | 84.0 | 8.6 | 0.2 | 0.5 | 1.1 | - | - | - | 1.3 | 4.2 | 100 |
| 1970 | 69.8 | 0.2 | 0.2 | 0.2 | 0.7 | 20.3 | 3.1 | - | 1.8 | 3.4 | 100 |
| 1971 | 68.6 | 0.1 | 0.2 | 0.5 | 0.7 | 17.8 | 5.0 | - | 3.6 | 3.4 | 100 |
| 1972 | 70.1 | 0.1 | 0.1 | 1.2 | 2.4 | 14.9 | 6.0 | 0.4 | 1.1 | 3.1 | 100 |
| 1973 | 68.8 | 0.1 | 0.7 | 1.6 | 1.4 | 14.6 | 6.6 | 0.7 | 1.2 | 3.6 | 100 |
| 1974 | 58.6 | 0.7 | 0.4 | 0.6 | 5.6 | 25.3 | 4.5 | 0.5 | 0.9 | 2.9 | 100 |
| 1975 | 56.0 | 0.4 | 0.5 | 0.6 | 6.6 | 27.2 | 4.1 | 0.9 | 0.7 | 2.6 | 100 |
| 1976 | 38.7 | 0.5 | 0.4 | 0.5 | 0.5 | 32.2 | 3.6 | - | 1.2 | 2.4 | 100 |
| 1977 | 57.0 | 0.4 | 0.9 | 0.4 | 7.6 | 27.6 | 3.0 | - | 0.8 | 2.3 | 100 |
| 1978 | 60.3 | 0.9 | 0.2 | 0.4 | 9.1 | 22.0 | 2.6 | - | 2.9 | 2.1 | 100 |
| 1979 | 61.2 | 0.2 | 1.6 | 2.4 | 6.8 | 21.1 | - | - | 1.9 | 2.2 | 100 |
| 1980 | 60.7 | 0.0 | 0.4 | 0.2 | 5.2 | 20.5 | 3.0 | - | 8.2 | 1.5 | 100 |
| 1981 | 62.9 | 0.0 | 1.8 | 0.4 | 3.4 | 15.6 | 3.0 | 0.01 | 8.1 | 1.4 | 100 |
| 1982 | 71.6 | 0.0 | 2.0 | 0.3 | 4.2 | 14.0 | 2.8 | - | 3.8 | 1.4 | 100 |
| 1983 | 68.2 | 0.0 | 1.4 | 0.3 | 5.9 | 13.2 | 2.8 | - | 5.8 | 1.4 | 100 |
| 1984 | 72.9 | 0.0 | 1.5 | 1.1 | 13.7 | 16.9 | 3.2 | - | 3.7 | 1.3 | 100 |
| 1985 | 41.4 | 0.6 | 1.4 | 21.6 | 8.9 | 6.7 | 3.6 | - | 17.7 | 0.6 | 100 |
| 1986 | 41.3 | 0.1 | 5.7 | 17.3 | 16.2 | 14.0 | 1.7 | - | 2.7 | 0.5 | 100 |
| 1987 | 27.6 | 3.2 | 1.6 | 13.9 | 30.9 | 12.2 | 3.9 | - | 7.9 | 0.3 | 100 |
| 1988 | 215.2 | 3.3 | 1.5 | 10.2 | 43.4 | 12.7 | 3.4 | - | 6.9 | 0.2 | 100 |
| 1989 | 21.6 | 0.1 | -2.9 | 7.4 | 47.4 | 13.1 | 3.4 | - | 9.5 | 0.5 | 100 |
| 1990 | 18.0 | -0.5 | -10.8 | 28.0 | 43.4 | 10.2 | 3.3 | - | 8.4 | 0.3 | 100 |
| 1991 | 14.7 | -0.0 | -9.3 | 25.6 | 49.3 | 8.7 | 4.0 | - | 6.5 | 0.6 | 100 |

Source: Computed from Bank of Tanzania - Economic and Operations Reports, various years.

| | |
|---|---|
| CC | Currency in circulation |
| CGD | Central Government Deposits |
| Bd | Bank Deposits |
| Dd | Other deposits |
| F1[b] | Foreign Liabilities |
| OI | Other liabilities |
| CL | Capital and Reserve |

# Appendix Table 4: Composition of commercial bank assets (%)

| | CQ | CBOT | TB | OGS | LLB | OT | LIQ | OTH | FA | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 1969 | 2.3 | 1.8 | 2.0 | 7.3 | 55.8 | 11.1 | 13.3 | 1.7 | 4.7 | 100 |
| 1970 | 1.9 | 0.1 | 0.0 | 6.8 | 60.7 | 9.2 | 16.0 | 1.1 | 3.9 | 100 |
| 1971 | 2.3 | 0.0 | 0.5 | 10.1 | 54.5 | 6.9 | 20.8 | 1.3 | 3.31 | 100 |
| 1972 | 3.8 | 0.2 | 4.8 | 17.5 | 75.0 | 8.6 | 32.5 | 1.0 | 4.8 | 100 |
| 1973 | 2.2 | 0.4 | 4.0 | 13.2 | 51.2 | 6.5 | 19.1 | 0.2 | 2.9 | 100 |
| 1974 | 1.7 | 0.3 | 7.1 | 10.1 | 55.7 | 7.1 | 15.3 | 0.2 | 2.1 | 100 |
| 1975 | 1.6 | 0.3 | 12.0 | 10.6 | 50.4 | 9.1 | 11.1 | 0.2 | 1.9 | 100 |
| 1976 | 1.7 | 0.2 | 16.3 | 11.6 | 47.7 | 11.3 | 8.8 | 0.0 | 1.9 | 100 |
| 1977 | 2.2 | 0.3 | - | 23.1 | 52.3 | 11.4 | 8.6 | 0.1 | 3.3 | 100 |
| 1978 | 2.2 | 0.6 | 0.7 | 18.4 | 61.6 | 7.6 | 6.0 | 0.0 | 2.6 | 100 |
| 1979 | 1.7 | 0.6 | 10.6 | 14.5 | 53.1 | 9.2 | 7.7 | 0.0 | 2.3 | 100 |
| 1980 | 1.7 | 0.3 | 17.4 | 12.0 | 45.2 | 12.2 | 6.4 | 0.0 | 2.1 | 100 |
| 1981 | 1.8 | 1.0 | 6.5 | 12.4 | 45.2 | 9.4 | 5.6 | 0.1 | 2.1 | 100 |
| 1982 | 1.6 | 0.9 | 27.3 | 10.9 | 38.7 | 22.0 | 6.5 | 0.0 | 1.8 | 100 |
| 1983 | 1.9 | 1.0 | 29.6 | 12.9 | 39.1 | 4.0 | 9.4 | 0.0 | 1.9 | 100 |
| 1984 | 2.6 | 1.3 | 27.6 | 11.0 | 38.8 | 10.2 | 4.7 | - | 2.0 | 100 |
| 1985 | 2.3 | 2.2 | 14.1 | 9.4 | 49.1 | 17.6 | 2.4 | - | 2.7 | 100 |
| 1986 | 2.7 | 0.2 | 0.0. | 8.8 | 65.3 | 13.9 | 4.8 | - | 4.2 | 100 |
| 1987 | 2.3 | 1.7 | 0.0 | 4.7 | 71.2 | 14.3 | 2.0 | - | 3.5 | 100 |
| 1988 | 1.7 | 2.4 | 0.0 | 2.8 | 70.4 | 19.2 | 0.1 | - | 3.1 | 100 |
| 1989 | 1.0 | 0.8 | 0.0 | 1.4 | 45.6 | 45.9 | 2.6 | - | 2.5 | 100 |
| 1990 | 1.3 | 0.8 | 0.0 | 1.0 | 47.1 | 43.1 | 3.6 | - | 3.0 | 100 |

Source: Deposited Bank of Tanzania, Economic and Operations Reports, various years.

| | |
|---|---|
| CQ | Cash |
| DBOT | Deposits with Bank of Tanzania |
| Tb | Treasury bills |
| OGS | Other Government Securities |
| LLB | Loans and bills |
| OT | Other (includes claims on other banks) |
| Lq | Liquid Assets (includes deposits with foreign banks and foreign units) |
| OTH | Other foreign assets. |

# Appendix Table 5: Average annual inflation rate,growth of money supply and GDP

| Year | Inflation (% Change NCPI) | Money Supply (%) | GDP (1976 Prices) % Change |
|---|---|---|---|
| 1968 | 16.0 | -2.6 | 4.5 |
| 1969 | 16.4 | 25.1 | 1.0 |
| 1970 | 3.4 | 22.7 | 4.8 |
| 1971 | 4.0 | 17.7 | 1.9 |
| 1972 | 8.6 | 15.7 | 5.8 |
| 1973 | 10.2 | 16.7 | 6.8 |
| 1974 | 19.7 | 22.1 | 2.3 |
| 1975 | 25.9 | 24.1 | 4.6 |
| 1976 | 6.9 | 23.7 | 6.1 |
| 1977 | 11.6 | 20.2 | 0.4 |
| 1978 | 6.6 | 12.6 | 2.1 |
| 1979 | 12.9 | 46.9 | 2.9 |
| 1980 | 30.3 | 26.9 | 2.5 |
| 1981 | 25.7 | 18.2 | 2.5 |
| 1982 | 28.9 | 19.5 | -0.5 |
| 1983 | 27.1 | 17.8 | 0.6 |
| 1984 | 36.1 | 3.7 | -2.4 |
| 1985 | 33.3 | 29.0 | 3.4 |
| 1986 | 32.4 | 29.2 | 2.6 |
| 1987 | 30.0 | 32.0 | 3.6 |
| 1988 | 31.2 | 35.2 | 3.9 |
| 1989 | 25.8 | 29.5 | 3.4 |
| 1990 | 19.7 | 25.2 | 4.4 |
| 1991 | 20.9 | 37.4 | 3.9 |

Source: National Accounts, Bank of Tanzania "Economic and Operations Reports", and BOT Economic Bulletin, various years.

# Appendix Table 6: Actual and simulated series

| OBS | PT | SIMLPT | GT | SGT | RT | SRT |
|---|---|---|---|---|---|---|
| 1985.2 | 558.00 | 596.35 | 29974.00 | 3546.16 | 19395.00 | 19426.32 |
| 1985.3 | 581.00 | 620.49 | 31596.00 | 35446.49 | 20114.00 | 20286.49 |
| 1985.4 | 660.00 | 691.81 | 33219.00 | 35982.86 | 20832.00 | 21625.53 |
| 1986.1 | 717.00 | 694.76 | 38785.00 | 36327.49 | 23471.00 | 23936.56 |
| 1986.2 | 716.00 | 709.30 | 44350.00 | 42696.55 | 26110.00 | 26277.24 |
| 1986.3 | 788.00 | 849.09 | 49916.00 | 47642.50 | 28748.00 | 28318.63 |
| 1986.4 | 880.00 | 875.09 | 55481.00 | 51874.35 | 31387.00 | 31354.79 |
| 1987.1 | 938.00 | 898.28 | 60825.00 | 57535.51 | 35279.00 | 35256.31 |
| 1987.2 | 948.00 | 899.30 | 66169.00 | 65782.52 | 39171.00 | 38986.46 |
| 1987.3 | 1010.00 | 906.00 | 72769.00 | 71688.00 | 43138.00 | 45658.00 |
| 1987.4 | 1134.00 | 1089.60 | 76856.00 | 79317.17 | 46954.00 | 46557.33 |
| 1988.1 | 1234.00 | 1179.98 | 84719.00 | 83078.43 | 53163.00 | 52300.96 |
| 1988.2 | 1239.00 | 1167.52 | 92583.00 | 93659.41 | 59372.00 | 58251.20 |
| 1988.3 | 1360.00 | 1391.41 | 100446.0 | 103419.6 | 65580.00 | 63501.96 |
| 1988.4 | 1454.00 | 1410.47 | 108309.0 | 11089.3 | 71789.00 | 70245.72 |
| 1989.1 | 1573.00 | 1518.68 | 116941.0 | 116426.0 | 78122.00 | 77718.87 |
| 1989.2 | 1587.00 | 1526.18 | 125571.0 | 126728.2 | 84456.00 | 85355.48 |
| 1989.3 | 1693.00 | 1573.63 | 134204.0 | 136918.3 | 90789.00 | 91989.65 |
| 1989.4 | 1800.00 | 1869.17 | 142835.0 | 144164.4 | 97122.00 | 99840.55 |
| 1990.1 | 1908.00 | 2022.97 | 156753.0 | 150294.2 | 106822.0 | 108674.3 |
| 1990.2 | 1876.00 | 1942.08 | 170670.0 | 167132.1 | 116521.0 | 116778.0 |
| 1990.3 | 2017.00 | 1842.68 | 184588.0 | 182167.2 | 126221.0 | 123352.4 |
| 1990.4 | 2142.00 | 1991.40 | 198505.0 | 191325.2 | 135920.0 | 132640.0 |

# Appendix Table 7: Correlation between actual and simulated series

| Price Index | Government Revenue | Government Expenditure |
|---|---|---|
| 0.992 | 0.997 | 0.883 |

# Notes

1. The high ratios during the two fiscal years were a result of the first "oil shock" and draught of 1974 and a second one in 1978. The break-up of the East African Community in 1977 and the war against Uganda added to the factors.
2. Recently high tax rates which have led to tax evasion and less compliance have been added to the factors, see Osoro (1990).
3. For a detailed treatment on the monetary theory of balance of payments, see Johnson (1972) and Frenkel and Johnson (1976).
4. A detailed discussion of the empirical studies is given in Egwaikhide *et al* (1992).
5. The range of factors are given in Rwegasira and Kanneworf (1980).
6. See Rwegasira (1976b)
7. This was also correctly pointed out by Rwegasira (1974) and Ndyeshobola (1980, 1983).
8. One would therefore question the repealing of the act that put statutory limits of government bank borrowing.
9. The area of tax administration would possibly be responsible for designing methods of achieving these goals.
10. Taxes such as personal and corporate income taxes and property taxes have the tendency to have longest lags. However, this is subject to empirical evidence.

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